

which little genuine evidence is forthcoming. He is wise in not paying too much attention to the numerous scientific "Mother Shiptons," who have so frequently attempted to gain credit for discoveries on the strength only of their prophecies. But the book can safely be recommended to such of our lay friends as meditate living in the tropics. R. R.

Abhandlungen Jean Rey's, über die Ursache der Gewichtszunahme von Zinn und Blei beim Verkalken. Deutsch herausgegeben und mit Anmerkungen versehen. By Ernst Ichenhäuser and Max Speter. Pp. 56. (Leipzig: W. Engelmann, 1909.) Price 1.20 marks.

JEAN REY'S "Essais sur la recherche de la cause par la quelle l'estain et le plomb augmentent de poids, quand on les calcine" have been familiar to English readers for some years past, through the valuable agency of the Alembic Club, which has issued an English translation as one of their series of reprints. The present German translation is published as No. 172 of Ostwald's *Klassiker der Exakten Wissenschaften*. The essays, written in 1630, contain a remarkable discussion on an increase in weight which had been observed, by an apothecary at Bergerac named Brun, to take place during the calcination of metallic tin in an iron vessel. The conclusion, arrived at by argument rather than discussion, that the gain in weight was due to the condensation of air, was a remarkable anticipation of views that were not generally accepted until the time of Lavoisier, 140 years later. The German reprint is provided with a valuable series of notes dealing with the history of the essays and with various points requiring elucidation in the essays themselves.

Elementary Regional Geography. Great Britain and Ireland. By J. B. Reynolds. Pp. viii+184. (London: A. and C. Black, 1910.) Price 1s. 4d.

Cambridge County Geographies. Nottinghamshire. By Dr. H. H. Swinnerton. Pp. xi+153. *Lanarkshire.* By Frederick Mort. Pp. viii+168. (Cambridge: University Press, 1910.) Price 1s. 6d. each.

MISS REYNOLDS has written an interesting and easy account of the geography of the British Isles which will be useful as an introduction to the subject. A few practical exercises for young pupils to work have been introduced; but the book would have been more valuable had this aspect of the teaching been more prominent. The excellent illustrations will certainly secure the attention of juvenile readers.

A very broad view of geography is taken by the writers of the latest additions to the "Cambridge County Geographies." Space is found by each author, in a slight treatment of a large subject, for sections on antiquities, ecclesiastical, military, and domestic architecture, and on the history of the county. Both volumes are well up to the high standard reached by other books in the series.

The Cambridge Pocket Diary for the Academical Year 1910-11. Pp. xv+255. (Cambridge: University Press.) Price 1s. net.

BOTH the staffs and students of schools and colleges will find this pocket diary very convenient. Beginning with September 20, 1910, and extending to September 30, 1911, it covers every length of academic year, and will be useful in all educational centres. Besides this interval of time, for which full space is given, several pages are devoted to the weeks until the end of 1911, so that important engagements for the early part of the succeeding professional year can be booked. The diary also contains a useful miscellany of general information.

NO. 2139, VOL. 84]

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Biological Laboratories at Woods Hole.

I HAVE noted with interest a recent discussion in *NATURE* of August 25 and September 15 and 29 in which the biological laboratories at Woods Hole have received incidental mention. I pray that you may give me this opportunity to correct some very prevalent misconceptions regarding the status of the Government station there. In *NATURE* of September 15 Prof. MacBride has voiced some of these misconceptions very clearly. "It is true," he writes, "that there are two stations in Woods Hole, one supported by the Federal Government and devoted entirely to economic work, and the other supported entirely by zoologists; but the station which has attained world-wide fame, owing to the quantity and quality of the research which has issued from it, is the second and purely scientific one" (pp. 330, 331).

Now, although Prof. Herdman has pointed out in two letters the misleading character of these statements, it appears that Prof. MacBride is "of the same opinion still," for in your issue of September 29 he avers:—"That valuable scientific work of general interest occasionally issues from the laboratory of the U.S. Bureau of Fisheries, which was founded and is maintained for research on economic lines, is totally irrelevant" (p. 396).

What the United States Fish Commission¹ laboratory at Woods Hole was originally founded for may best be gathered from a perusal of the earlier annual reports of the first commissioner, the naturalist Spencer F. Baird. He emphasises more than once the futility of attempting to deal broadly with fisheries problems without an intelligent understanding, not only of marine life as a whole, but of all the various physical and chemical factors which may affect this. (See especially first report of the commissioner, p. xiii.)

The whole history of the United States Fish Commission, and of the Woods Hole station in particular, bear abundant testimony to the sincerity of this broad-minded attitude of its founder. The pioneer faunistic work of Verrill and his colleagues in the 'seventies and 'eighties was carried out very largely under the auspices of the National Fish Commission, and Woods Hole was the chief headquarters from which these explorations were conducted. Furthermore, one need only refer to the past reports of the commission to find in the list of those who have worked at the Woods Hole station many of the most prominent names in American biology. Here we meet, for example, with the names of Farlow and Gill, of E. B. and H. V. Wilson, of Morgan, Bumpus, Andrews and Eigenmann, to say nothing of Brooks and Ryder, who have passed away. These men were not, for the most part, engaged upon "economic" problems in any strict sense of the word. And in more recent years some of the physiological work of G. H. Parker, C. J. Herrick, W. B. Cannon, E. P. Lyon and others, has been conducted in the Fish Commission laboratory, as well as the taxonomic work of such men as Edwin Linton, C. W. Hargitt, C. C. Nutting, W. M. Wheeler, H. L. Clark, and C. B. Wilson.

I regret that anything like a defence of the scientific status of the Fisheries Laboratory has been necessary in these columns, for the facts here stated are well known to every American zoologist who is familiar with conditions at Woods Hole. But unfortunately all zoologists, even in America, are not familiar with the conditions at Woods Hole, and the misconceptions voiced by Prof. MacBride are still held tenaciously in certain quarters.

As Prof. Herdman has pointed out, there are two scientific laboratories at Woods Hole. But conditions are even more complicated than this, for the Bureau of Fisheries itself maintains two more or less independent institutions there. One is the biological laboratory, maintained by

¹ Changed in 1903 to the Bureau of Fisheries of the Department of Commerce and Labour.

the Bureau's "Division of Scientific Inquiry," the other the hatching station, maintained by the "Division of Fish Culture." These two establishments are under different heads, and are, so far as possible, independent of one another, though they to a large extent share the same buildings. The biological laboratory, in the general scope of its work, does not differ widely from the other leading marine laboratories of the world. It is true that greater emphasis is laid upon the economic aspect of marine biology, and a number of investigators are each year employed by the Bureau to conduct researches upon such subjects as the food value and chemical composition of marine organisms, or upon problems directly related to the natural history of food fishes; but to say that investigations are restricted to such lines is to do great violence to the facts. The Bureau has always put a liberal construction upon the word "practical," realising that no hard-and-fast line should be drawn between pure and applied science, and regarding all information as ultimately useful which gives us a deeper insight into the life of the sea.

The two biological laboratories at Woods Hole—the "Marine Biological Laboratory" and that of the Bureau of Fisheries—have worked together side by side since the establishment of the former in 1888. The choice of its name by the privately supported institution has—unintentionally, of course—been the source of much of the misapprehension of which I am speaking. The name, "*The Marine Biological Laboratory*," would seem to imply an exclusive occupancy of this field, whereas the United States Fish Commission was conducting biological work at Woods Hole as early as 1871, and its present laboratory building was erected in 1885.

Another source of misconception is the fact that the Fisheries Laboratory has no definite organ of publication. Its scientific results, so far as they are economic or faunistic, or in any way related to the natural history of the sea, are in a large measure published in the *Bulletin of the Bureau of Fisheries*. The results in other fields of work are embodied in papers—and the number of these is great—scattered through all our various biological journals in this country and abroad. On the other hand there exists the "*Biological Bulletin*," which is the official organ of the Marine Biological Laboratory, though it also accepts contributions from workers in all parts of our country, oftentimes including those in the Fisheries Laboratory at Woods Hole. It is needless to add that the Marine Biological Laboratory does not make the least pretence that this journal represents its own output in any exclusive sense.

But, after all, the main source of confusion relative to the two laboratories at Woods Hole is the fact that the biologists there form a single scientific community, the members of which mingle freely together without regard to their place of work. In fact, the same investigator may work one year in one laboratory, the next year in the other, or he may even hold tables in both simultaneously; and so the reading public lumps together all our productions as Woods Hole work, and draws no fine distinctions. In the circumstances, it is natural that the laboratory which bears the name of "*The Marine Biological Laboratory*" should be frequently credited with the entire output. This is written in no spirit of resentment, but merely as an explanation of the prevalence of this widespread misconception of the situation at Woods Hole.

It will be cheerfully granted that the "Marine Biological Laboratory" accommodates a much larger number of investigators—perhaps twice as many, on the average—as does its sister institution; and it is not likely that anyone connected with either laboratory fails to recognise that a considerably greater output of scientific results must at present be credited to the former. On the other hand, the Government laboratory had, until recently, the only really efficient steam vessels available for scientific research, and has had other decided advantages in its physical equipment. But we at Woods Hole waste little time in idle comparisons such as these. Most of us are too busy endeavouring to make an occasional contribution to our common science.

Whether or not the two laboratories will continue to cover so largely the same field of activity it remains for

the future to decide. These are some good arguments for a greater division of labour than at present exists.

FRANCIS B. SUMNER.

(Director, Biological Laboratory of the
U.S. Bureau of Fisheries at Woods
Hole, Mass.)

Washington, D.C., October 12.

The Cocos-Keeling Atoll.

I CONSIDER myself fortunate that the author of the review of "*Coral and Atolls*," which appeared in *NATURE* of October 6, has addressed two direct questions to me, for in the answering of these questions it may be possible to open in a more frank manner the discussion of those problems with which I have dealt, and which are to be solved by dispassionate argument and investigation rather than by anonymous destructive criticism.

The first question which the reviewer puts to me is couched in the following form: he rightly asserts that I assume the lagoon of an atoll to be a slightly submerged reef, and then he asks, "Why this assumption without evidence?" For answer I would point out that the evidence is given freely in the work which he reviews (notably at pp. 251-2, and elsewhere), and, since he has apparently overlooked it, I will repeat that it consists, among other things, of the fact that submerged atoll-shaped reefs, and reefs also atoll-shaped, but of which some portion of the outer rim is awash, or on which some island débris is piled, are well-known geographical facts. The central part of the submerged reef forms the lagoon of the developed atoll, which is therefore not inaptly described as a "slightly submerged reef."

His second question is in connection with the mode of formation of atolls from the disintegration of high oceanic islands surrounded by a barrier reef. He asks me how I would explain "Agassiz's wonderful series of photographs of Fijian islands within barrier reefs" when I state that "the picture of the high island towards the completion of the process, when, after having stood resisting in a troubled sea, it so conveniently crumbles to pieces within the calm of an encircling barrier reef, appears to me to be contrary to all natural laws." I would give as explanation the very obvious suggestion that the formations illustrated (I presume in *Bull. Mus. Comp. Zool. Harv.*, vol. xxxiii.) are not the outcome of the development of the barrier reef, for similar conditions are found, quite apart from any coral structures, all over the world, the coast-lines of islands in northern seas providing equally good examples.

It may perhaps be permissible to extend this reply so as to embrace the answers to some assertions of the reviewer regarding corals and coral islands, and to point out some misquotations from the work under discussion and some misconceptions of its conclusions.

The variability of the growth forms of corals is one of the problems discussed, and I have urged that sediment—as a factor of the environment—is a potent cause of modified coral growth. That the environment as a whole, and not merely the presence of silt, was considered, may be gleaned from the discussion of the growth of young colonies of *Pocillopora* (p. 100).

The reviewer turns from this to observe that the variability of corals "may aptly be compared to the growth shown by our forest trees in different environments. Reef corals, too, resemble trees in that they are largely dependent for their food on chlorophyll, which is present in minute algæ living in their digestive cavities. The coloration of most reef corals is largely due to these algæ, and their mode of growth is sympathetic to them in that the coral skeleton is deposited so as to expose the polyps to the maximum amount of light." The reviewer then adds, "Such appear to us the ordinary views of zoologists."

The only logical meaning that I can attach to this is that zoologists as a class ordinarily believe that the variability of the growth forms of corals—and of forest trees—is due to the fact that they contain chlorophyll in their tissues. That zoologists as a class would subscribe to this thesis appears to me unlikely, and the reviewer has yet